

Article

Toward an Exciting Rebuilding of Modern Physics: Forward

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ABSTRACT

For contributing to a true advancement of science, physicists should define a correct attitude toward revelation, identify, like the classical physicists, the physical information incorporated in the terms of the underlying equations, and give a rationale for their work, or any work they investigate. Einstein's merit of turning parts of revealed knowledge (without being aware of dealing with it) into rational knowledge in deducing the Lorentz transformation in [1] proves that his genius was actually far more impressive than that just celebrated in the World Year of Physics 2005 [3]. Unfortunately, his resulting jumps over all explanatory steps have hidden his distinguished performance.

Key Words: Einstein, Lorentz transformation, special theory of relativity, Dirac matrices, revealed knowledge, modern physics.

FORWARD

At the time factors of unknown origin and physical meaning (like β in the Lorentz transformation, the Dirac matrices, etc.) are embedded in some underlying equations and, by way of consequence, the physical significance of the terms of these equations rests undisclosed, we validate the principle of the physical determination of equations¹ in special relativity theory and relativistic quantum theory, as first step toward an exciting foundation of modern physics on this principle (yet all restraints of the principle are off in modern physics).

At the time science and secularization are on ascending trend, discarding any role to revelation (as disclosure by God) in the act of science², we give a rationale to Einstein's derivation of the Lorentz transformation from [1] which discloses both this role and its discarding as main source of the century-old hidden crisis of physics. With no role of revelation in the act of science, there is presently no expected role for the principle of the physical determination of equations in the future development of physics, so no way to remove the crisis.

At the time special relativity theory is discarding the concepts of absolute rest and absolute speed, and it is yet claimed that the two concepts are "completely foreign and unacceptable to physics" [2], we disclose both coordinate systems at absolute rest and absolute speeds in special relativity theory. Since the axes of these coordinate systems are not related to positions of bodies of reference frames,

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¹ It every term of the underlying equations of any physical theory has incorporated an explicit physical significance. This is what we call the principle of the physical determination of equations. This principle was basic to develop classical physics. It should have been basic to develop modern physics, too. However, this principle was never defined in physics textbooks, and its special importance for the advancement of physics never pointed out.

² The birth of any new idea, or set of coupled ideas, contributing to the advancement of science is an act of science.

the principle of relativity is not violated. The absolute speeds are determinable in terms of measured light travel times (i.e., independently of any physical substratum) by the experiment just used to deduce the Lorentz transformation from [1]. Determined in this manner, the absolute light speed c assures the covariance of the equation $x=ct$. So it becomes evident in this work that the discarding of the concepts of absolute rest and absolute speed was equivalent to deleting vital passwords for accessing essential information for the advancement of physics.

At the time particle physicists proclaim that the whole information about 'elementary' particles is *exclusively* predicted by well-settled particle theories, and *exclusively* proved experimentally by the particle accelerator facilities, culminating with the Super Collider, we show that, through the principle of the physical determination of equations, the relativistic quantum theory provides genuine information, experimentally testifiable by radically new techniques. The relativistic mass arises to be the coupling constant of some constituents of the 'elementary' particles, and its value can be changed by acting upon the coupling of the constituents. So that, the standard particle theories, which can make no prediction on the nature of mass, are not so 'well-settled', and the particle accelerator facilities are not so 'exclusive' experimental tools. Moreover, the information obtained by colliding high energy particles is, by its limited diversity, mainly useless in the absence of the new information.

We prove that it all started wrong with the derivation of the Lorentz transformation in [1] keeping the Newtonian habit of determining absolute speeds by measuring the quantities appearing in the definition of speed, claiming that "no properties of phenomena attach to the idea of absolute rest" and disregarding the systematic change over time in direction and magnitude of the radius vectors of geometrical points moving with respect to inertial observers.

Tracing by physical signals such radius vectors, we determine their direction and magnitude at the time of their projection onto coordinate axes. So, by also assuming that identical inertial clocks run at the same rate and inertial meter-sticks keep their length unaltered, no matter of their speed, we deduce a new class of time-dependent coordinate transformations, which we call 'complementary time-dependent coordinate transformations'. Deriving, for light signals, the Lorentz transformation as a complementary time-dependent coordinate transformation, we disclose the objective reality warranting the manipulations of some equations that led to the Lorentz transformation in [1]. The correctness of the derivation of the Lorentz transformation in [1] and the validity of our assumptions within Einstein's special relativity theory follow. So there was no need to discard the concepts of absolute time, absolute rest and absolute motion at the foundation of the special relativity theory. Bringing into accord the tracing of radius vectors by light signals with the addition of travel times as scalar quantities, we obtain the meaning of 'Cartesian coordinate' for the term βx of the Lorentz transformation, and the meaning of 'Newtonian time' for the term βt of the Lorentz transformation - the only equations in special relativity theory with terms without physical meaning identified-, so remove the mysterious origin of β and validate the principle of the physical determination of equations in this theory.

Einstein's performing of manipulations of equations as if he knew their physical support, the development of special relativity theory without the derivation of the Lorentz transformation from [1] (in despite its correctness), and the missing of the principle of the physical determination of equations (essential for disclosing physical information vital to a true advancement of physics) from special relativity theory (which the manipulations of equations should validate) disclose the role played by revelation in the act of science.

The genuine subquantum information which we provide, and its application to radically new technologies -that should have been developed as early as the 1940's- put an end to the present

nuclear era. It also illustrates the terrifiant effect of the crisis of modern physics, raised and maintained by the physicists' attitude toward revelation and the resulting uncontrolled mixture of revealed and rational acts in the act of science (mixture caused not only by denying the divine but also any rationale for the revealed knowledge), the foundation of the relativistic quantum field theories before wholly understanding the relativistic quantum theory, a systematic physics policy prohibiting disclosing its physical grounds and corruption, as well. The progress of the mankind is assured by the exploitation of the subquantum energy.

So, for contributing to a true advancement of science, physicists should define a correct attitude toward revelation, identify, like the classical physicists, the physical information incorporated in the terms of the underlying equations, and give a rationale for their work, or any work they investigate. Einstein's merit of turning parts of revealed knowledge (without being aware of dealing with it) into rational knowledge in deducing the Lorentz transformation in [1] proves that his genius was actually far more impressive than that just celebrated in the World Year of Physics 2005 [3]. Unfortunately, his resulting jumps over all explanatory steps have hidden his distinguished performance.

The work begins with an outline of the crisis of modern physics in Section 1, and is divided into three parts. Every section is devoted to a small subject in order to make clear our insight into that subject. The first part, Sections 2 through 11, netly defines the 'complementary time-dependent coordinate transformations' (in Sec. 2), our working hypotheses (in Sec. 3), the concepts of space, reference frame and coordinate system (including the new concepts of 'abstract' coordinate system and 'abstract' coordinate system at absolute rest) (in Sec. 4) and our working method (in Sec. 5), then presents the derivation of both the 'complementary time-dependent coordinate transformations' and the Lorentz transformation as a complementary time-dependent coordinate transformation. The second part, Sections 12 through 26, applies the derivation of the Lorentz transformation as a complementary time-dependent coordinate transformation to Einstein's special relativity theory, determining the objective reality behind his manipulations of equations that led to the standard Lorentz transformation from [1], so proving the correctness of the derivation of the Lorentz transformation from [1] and the validity of the principle of the physical determination of equations in this theory. The third part, Sections 27 through 42, validates the principle of the physical determination of equations in the relativistic quantum theory, providing genuine information applicable to radically novel technologies. Conclusions are drawn in Section 43. An epilogue on the transition from 'physics policy' to 'physics as policy' is added as Section 44.

Readers will find some incipient ideas on the subject, and attitudes toward these ideas in, respectively, the copies of some of author's published papers (under the names A. Ceapa and A.C.V. Ceapa) and private letters included in Appendix.